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Preparation of technical reports

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PREPARATION OF TECHNICAL REPORTS

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Probably no good engineer has ever been fired simply because he was a poor report writer. Far too often, however, good engineers have missed out on promotions and other rewards because their poorly written reports did not do justice to their technical achievements. Unless you can communicate effectively to others the information and knowledge you have gained through experimentation, much of the value of your work will be lost. Writing is one of the higher forms of human endeavors. Your writing can be expected to serve as a source of reference to others. Your future employer will be entitled to a written record of what you have been paid to do. Writing is invaluable assistance in the organization of your thoughts for future efforts. The activity of reporting, therefore, is an important part of your work, laborious as the job often seems.

The specific content of your report will depend somewhat upon why it was written and for whom; i.e., journal (which), patent people, supervisor, administration, contractor. The format presented here is the formal final report format which is usually followed because it presents the material in a logical order. You must have very good reasons for using a different form. Recognize the other forms, however, which are based on other objectives than project summary. Occasionally, the requestor of the report wishes at that time only a summary of results or progress and not much on the details. The letter to the editor form is an abbreviated version of the following to serve the purpose of rapid communication. Examples of the reporting we are trying to develop here will be found in any of the technical journals such as PHOTOGRAPHIC SCIENCE AND ENGINEERING, the JOURNAL OF THE AMERICAL CHEMICAL SOCIETY or APPLIED OPTICS.

A technical report should be written in correct, non-colloquial language with due attention to clarity, completness and conciseness, grammar, diction, spelling, punctuation and style. It is well to have your report reviewed by a competent writer before handing it in--not with the idea of having someone do the job for you (which you won't have in industry) but to learn from the association.

I. REPORT FORMAT

The major sections of reports are: abstract, introduction, experimental, results, discussion, conclusion, acknowledgement, references and appendix. Sub-headings are a distinct aid to the reader. Use them to assist the flow of your report.

A. Cover

The covers will follow a standard format, prescribed for easy reference and filing. Place the experiment number, course number and the date the report is submitted in the upper right corner. Place the title of the report about ten spaces above your name in the center of the page.

The title may be the title of an experiment. In any case, it should be chosen carefully in order to convey immediately, accurately and as completely as possible, the subject matter of the report.

B. Abstract

A short statement of the purpose of the work, the pertinent conditions, and the results in brief. Since this is a concise summary, it should be the last part written. It is designed for the reader's quick appraisal of the nature of your report. Remember-- the abstract may be the only part of your report read so it must tell what you did, how, for what purpose and with what results in consise, yet meaningful statements. Abstracts are usually done in one paragraph. When they are only three or four sentences, stick with this.

Statements of proposed additional work are not appropriate for an abstract.

C. Introduction

This is often called "Objectives", and the statement of objectives is the most important function of this section. This comprises the problems which the experimentation was designed to answer. The objectives need to be exactly and clearly stated. The justification for performing the investigation should be here also. This often takes the form of a brief historical reviewof the problem.

D. Experimental

Make this sufficiently clear and complete so that another person could repeat the work. A standard procedure or standard apparatus need not be more than mentioned. Describe, however, any deviations from standard procedure. Do not list equipment and chemicals used. It may be important for subsequent work to list the serial or property number of the specific instrument or lot number of a chemical reagent used. Under no circumstance transcribe the lab instructions. Indicate calculations also, the approaches used in treating the data, e.g., definitions of sensitometric and image quality parameters.

E. Results

Include raw data and calculated values, visual observations, plots. (Raw data that are extensive, such as density measurements, can remain in the notebook. If, however, the author feels they are essential to the report, he may include them in the appendix or simply reference them to a notebook if the report distribution is limited).

Great pains need to be taken in the presentation of this section. Place tabulated data and calculated results in tables wherever possible; use overlay on graphs, place families of curves on the same page to make comparisons easy; illustrations, graphs and tables can eliminate the need for pages of description. Sample calculations belong in the appendix.

Complex coding of sample should be avoided in the final report. Readers won't bother to leaf through pages of report to try to figure out what sample 6-d-1 or 4-b-8 is. On plots, in tables and in discussion, it is better to describe the sample. If this is not possible, put in a table of sample numbers and descriptors so that the reader may be able to turn to one place to break your code. Be sure also that your results are presented in logical order so that the reader will not have to look back and forth in this section to find it intelligible.

IMPORTANT POINT: you want the reader to be induced to read your report, not somebody else's. Make it as easy for him as possible.

F. Discussion

The entire experiment and report to this point has been directed toward collection of material for this section.

This section should discuss the significance of what you have done. Do not simply put into words what you got for results. Analyze! Make quantitative comparisons of the data in view of what you know.

Build a case for your conclusions. Speculate if you don't know anything. What seems reasonable to you. Discuss the merit of the whole experiment as a means of obtaining the information you were after. What is the validity of the data. Above all, be quantitative.

G. Conclusion

The conclusion is the statements of fact which are inferred from your experiment results. In a successful experiment, the conclusion is the answer to the problem stated in the objectives. There are three approaches to the conclusion section: 1) It may stand alone as indicated here. 2) At times, it is impossible, awkward or tedious to set it as a separate section when it fits better into the discussion. In this case, the two sections become one under the title "Conclusion". 3) Placing the conclusions in tabular form at the front of the report after the abstract is becoming very common in government and company reports. This presumable gives the reader the main thing he is looking for from the onset of his reading.

H. Acknowledgment

Credit persons other than the author or authors who have made substantial contributions to the success of your work, such as through discussions with you, loan of equipment, computations, a small experiment or some other service.

I. References

Practice is not entirely uniform but the following samples of different references are preferred. Each journal or company will convert your work to its practice. Mees and James contains 2689 references and practically every situation is covered there repeadly.

1. C.K.E. Mees and T.H. James, THE THEORY OF THE PHOTOGRAPHIC PROCESS, 3rd Ed., Macmillan Co., New York, 1966

2. J.R. Manhardt and D.J. Forst, "The Albert Effect: I.Dual Mechanism", PHOTO. SCI. ENG., 8, 265 (1964)

3. Kodak Publication J-1, "Processing Chemicals and Formulas for Black and White Photography", 1963

4. R. Francis, personal communication.

5. G. Achilli, Laboratory Report for R.I.T. Course 41-101, Experiment 5a, "Omission of an Ingredient from a Developer", Fall 1969

J. Appendix

Information relevant to the report, but of a supplementary nature is presented. This might include such things as:

a) sample calculations.
b) detailed and involved diagrams of equipment, supplemental testing procedures.
c) long tables of data.
d) supplemental discussion such as a vaguely related application of the results.

K. Recommendations for Future Work

These are part of your conclusions and belong in that section.